IN THE SPECIFICATION

Please amend the paragraph at page 1, line 3, as follows:

The present invention relates to a fine channel device having a fine channel for conducting a chemical reaction, forming ~~droplet~~ droplets or analysis, in particular, a fine channel device suitable for mixing or a chemical reaction of fluid fed into the fine channel, and solvent extraction or separation or recovering a catalyst from a product, and a ~~chemically~~ chemical operating method using such fine channel device.

Please amend the paragraph beginning at page 1, line 11, as follows:

In recent years, research for a chemical reaction by using a fine channel device comprising a glass substrate of several cm square provided with a fine channel having a length of several cm and a width and a depth of from sub-μm to several hundred μm wherein fluid is fed to the fine channel, has been noted. It is reported that in such fine channel, a rapid diffusion of molecules takes place due to effects of a short diffusion distance of a molecule and a large specific interfacial area in a fine space whereby a very efficient chemical reaction can be conducted without a special stirring operation, or a compound obtained by a chemical reaction can rapidly be extracted or separated by a solvent extraction/separation method from a reaction phase to an extraction phase whereby a side reaction which may occur subsequently can be suppressed (see, for example, ~~a non-patent document 1:~~ the publication entitled: "Fast and high conversion phase-transfer synthesis exploiting the liquid-liquid interface formed in a microchannel chip" by H. Hisamoto et al., Chem. Commun., published in 2001, pages 2662-2663). Here, the fine channel means generally a channel having dimensions of 50-300 μm in width and 10-100 μm in depth.

Please amend the paragraph beginning at page 2, line 13, as follows:

In the technique described in the above-mentioned document, a Y-letter like fine channel as shown in Fig. 1 is used. An aqueous phase 1 in which a raw material is dissolved and an organic phase 2 are introduced into the fine channel to cause a chemical reaction at the fluid boundary 3 of aqueous and organic phases formed at a Y-letter like confluent portion. The Reynolds number is generally less than 1 in a channel of microscale, and therefore, a laminar flow as shown in Fig. 1 is provided unless flow rates are exceptionally increased. Further, since the diffusion time of molecules is in proportion to the second power of the width 9 of the fine channel, the mixing is accelerated by the diffusion of molecules, without positively mixing the reaction liquid, as the width of 9 of the fine channel is made [[more]] much smaller, whereby a chemical reaction or solvent extraction is apt to occur. The fluid boundary is often called the laminar flow interfacial surface.

Please amend the paragraph beginning at page 6, line 21, as follows:

Because of the above-mentioned factors, it is not easy to stably form ~~stably~~ the fluid boundary 3 as shown in Fig. 2 in the fine channel. In particular, when fluid is supplied at a low flow rate to obtain a long stay time of fluid in the fine channel so that a chemical reaction time or a solvent extraction time in the fine channel can be prolonged, fluctuation in the fluid supply rate or a wraparound phenomenon of fluid is apt to occur.

Please amend the paragraph beginning at page 7, line 23, as follows:

Namely, in the conventional technique, there was fluctuation in the position of the fluid boundary due to a change of the flow rate per unit time, which was caused by the fluid supply pump whereby a laminar flow could not be maintained, and a wraparound phenomena of fluid took place due to a difference of affinity between the inner wall of the fine channel

and the fluid to be supplied. Accordingly, a kind of fluid was caused to be mixed with another kind of fluid to be discharged through an outlet port of the fine channel, and it is impossible to stop completely a chemical reaction or solvent extraction which is caused by the mutual contact of fluid in the fine channel at the branch portion of the fine channel. Further, in order to reuse the fluid supplied once to the fine channel, it was necessary to separate a mixture comprising at least two kinds of fluid discharged from an outlet port. According to the conventional technique, however, it was difficult to ~~realize~~ easily [[the]] reuse [[of]] the fluid.

Please amend the paragraph beginning at page 9, line 9, as follows:

Further, since it was difficult to separate sufficiently at least two kinds of fluid without causing [[the]] mixing between adjacent flows of fluid after they were passed through the fine channel as described above, a contact time of fluid, i.e., a time of solvent extraction in which an extracted material in an extracted solvent is extracted into an extracting solvent, between adjacent flows of fluid in the fine channel, the contact time being determined by a length of the fine channel and/or a flow rate of fluid, could not be determined only in the fine channel. Therefore, the process of the solvent extraction could not be stopped in the fine channel whereby the solvent extraction proceeded even after at least two kinds of fluid had passed through the fine channel. For example, the mixing proportion of fluid varied at the outside of the fine channel, and it was impossible to conduct the solvent extraction keeping a predetermined volume ratio of the extracted solvent to the extracting solvent. Further, it was difficult to separate sufficiently the extracting solvent used for solvent extraction in the fine channel from the extracted solvent outside the fine channel. Here, the solvent extraction means the extraction of a material to be extracted in an extracted solvent into an extracting solvent as described above. In the present invention, however,

[[it]] includes the feature that a liquid phase comprising liquid is vaporized and the vaporized phase is brought into a gas phase comprising gas which is adjacent to the liquid phase.

Please amend the paragraph beginning at page 11, line 6, as follows:

Further, there has been attempted a technique of contacting adjacent laminar flows of fluid in a fine channel by supplying a plurality kinds of fluid in mutually opposite directions or by crossing them at an arbitrary angle (see, for example, ~~a non-patent document 4~~ the publication entitled: "Development in the formation of three-dimensionally crossing multilayer streams", p. 55, preliminary papers for lecture by Akihide Hibara et al. in the 3rd Chemical and Microsystem Society, published in 2001). In such technique, there is an expectation [[about]] regarding the capability of changing a balance in a chemical reaction or solvent extraction by avoiding the flow of the same direction between adjacent flows of fluid. The above-mentioned ~~non-patent document 4~~ Hibara et al. publication shows an experimental result in which a fine channel made of glass having a length of about 1 mm or less wherein a side portion of the inner wall of the fine channel which has originally hydrophilic properties is modified by trichlorooctadecylsilane which is generally known as a hydrophobic modifier, is used. Thus, it was difficult to make adjacent laminar flows of fluid contact in the fine channel by supplying them in mutually opposite directions or crossing them at an arbitrary angle. In particular, it was very difficult to realize the above-mentioned operations in a fine channel having a longer distance. There was no possibility of conducting experiments for verification as to whether or not a balance in a chemical reaction or solvent extraction could be changed by such operations.

Please amend the paragraph at page 12, line 7, as follows:

Further, in order to modify the fine channel as proposed in ~~the non-patent~~ Hibara et al al. publication noted above ~~document 4~~, a plurality of processes such as a pre-washing process, a modifier supplying process, a modifier stabilizing process, a post-washing process and so on were needed. Such fine channel modification required much time and cost, and the durability of the modifier was only about 1 to 4 weeks. Accordingly, there was no fine channel capable of assuring a semipermanent supply of fluid.

Please amend the paragraph at page 12, line 16, as follows:

Further, in the fine channel as shown in Fig. 1, a chemical reaction took place mainly at the fluid boundary 3 (see, for example, ~~a non-patent document 5~~ the publication entitled: "An integration type microreactor chip", p. 99-105, vol. 20 by Fujii et al., published in 2001). Accordingly, the diffusion effect of molecules brought only the accumulation of a reaction product at the fluid boundary, and the above-mentioned effects of providing an effective chemical reaction as a feature of the chemical reaction in a fine space, a rapid solvent extraction/separation and control of a side reaction, could not sufficiently be obtained. Although the diffusion time of molecules can further be shortened by narrowing the width 9 of the fine channel, and the accumulation of a reaction product at the fluid boundary can be suppressed as described before, the pressure loss increases as the width of the fine channel is narrowed. Accordingly, the fluid supply itself becomes difficult and it was not realistic.

Please insert the following heading at page 22, between lines 4 and 5:

BRIEF DESCRIPTION OF THE DRAWINGS

Please insert the following heading at page 25, between lines 17 and 18:

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please amend the paragraph beginning at page 25, line 21, as follows:

In the present invention, a plurality of partition walls are provided with intervals in the fine channel. With respect to the positional relation between a partition wall and the inlet channels and between a partition wall and the branch portion of the outlet channels, partition walls 22 may be formed at positions apart from the confluent portion 37 and the branch portion 4 as shown in Fig. 8(a). However, it is preferable as shown in Fig. 8(b) that the partition wall formed closest to the branch portion of the fine channel is connected to the branch portion. With such, two adjacent flows of fluid can be separated smoothly without causing mutual contamination of the two kinds of fluid. As an embodiment of the arrangement of the partition walls, there is at least one absent location of partition wall except the vicinity 42 of the confluent portion 37 and the vicinity 43 of the branch portion 4 of the fine channel. In a preferable embodiment, longer partition walls are formed in the vicinity of the confluent portion and the branch portion in Fig. 8(c), or partition walls are formed so as to continue from the confluent portion and the branch portion as shown in Fig. 8(d). Thus, by providing a partition wall in the vicinity of the confluent portion, the mixing between adjacent flows of fluid by mutual contact can be minimized, and by providing a partition wall in the vicinity of the branch portion, the mutual contamination between the adjacent flows of fluid caused by separating suddenly the adjacent flows of fluid can be minimized. The arrangement that there is at least one absent location of partition wall except the vicinity of the branch portion of the outlet channels means that at least two partition walls are formed with an interval in a flowing direction of fluid.

Please amend the paragraph at page 29, line 14, as follows:

Positions of the partition walls with respect to a width direction of the fine channel are not in particular limited, and the positions may be changed depending on an amount of fluid to be supplied, [[a]] the flow rate or the ~~natures~~ nature of such solution such as the viscosity thereof. It is considered that the position of the fluid boundary changes gradually in a flowing direction of fluid due to changes of viscosities of adjacent flows of fluid during operations of the mixing or a chemical reaction of fluid or solvent extraction. Even in this case, the change of viscosities can previously be estimated by using simulation or the like, and according to the simulation, partition walls can be formed according to the estimated position of fluid boundary. On the other hand, when partition walls are formed at or near the center with respect to a width direction of the fine channel, and when two kinds of fluid having different viscosities are supplied, the fluid boundary can be determined at or near the partition walls if these kinds of fluid are supplied flow rates in inverse proportion to the viscosities of fluid from Formula 7. Although the thickness 23 of the partition walls 22 is not in particular limited, it is preferable that it is about 3-10% of the width of the fine channel so as not to be an obstacle to fluid supply. The height 24 of each partition wall is not in particular limited as long as it is not more than the depth 17 of the fine channel. In the most preferable case, the height is the same as the depth 17 of the fine channel. Further, the shortest distance 25 of adjacent partition walls in a flowing direction of fluid is not in particular limited as far as partition walls 22 are formed with intervals. However, if the distance 25 is too small, a contact time of fluid becomes short whereby it is difficult to conduct a chemical reaction or solvent extraction sufficiently. Accordingly, the distance is preferably at least about 50 μm.

Please amend the Abstract at page 101 as follows: